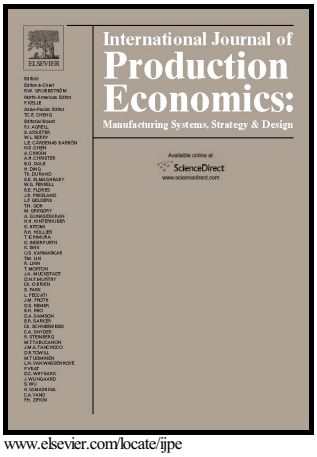

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PII: S0925-5273(17)30135-4
DOI: http://dx.doi.org/10.1016/j.ijpe.2017.04.010
Reference: PROECO6704

To appear in: *Intern. Journal of Production Economics*

Received date: 25 November 2016
Revised date: 16 March 2017
Accepted date: 27 April 2017

Cite this article as: Liu Yang, Haitao Li, James F. Campbell and Donald C Sweeney, Integrated Multi-Period Dynamic Inventory Classification and Control *Intern. Journal of Production Economics* http://dx.doi.org/10.1016/j.ijpe.2017.04.010

Integrated Multi-Period Dynamic Inventory Classification and Control

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Abstract

This paper investigates the dynamic integration and optimization of inventory classification and inventory control decisions to maximize the net present value (NPV) of profit over a planning horizon. A mixed-integer linear programming model is developed by explicitly accounting for various real-world complexities, such as nonstationary demand, arbitrary review period, and limited inventory budget. We apply the model to a 900-SKU experiment and observe an average 7.5% improvement in profit over the traditional ABC approach. A real-world application for a cheese manufacturer provides a nearly 3% improvement in company's profit with a 13% reduction in inventory capital compared to its current eight-class multi-criteria inventory classification scheme. Comprehensive computational experiments are performed to examine the individual and interactive effects of various parameters on the inventory performance. Results show that it is critical for a company to manage its inventory both dynamically in the face of nonstationary demand and holistically by integrating SKU classification and policy setting. Our work provides a practical decision-support tool that simultaneously optimizes multi-period inventory classification and control decisions under nonstationary demand. It contributes to the inventory management literature by bridging two distinct streams of inventory research, inventory classification and inventory optimization, within a practical inventory modeling framework. Our study also offers several managerial implications for manufacturers and distributors managing finished goods inventory.